

Appl. No. 10/064,605  
Amdt. Dated 8 September 2005  
Reply to office action of June 9 2005

### REMARKS/ARGUMENTS

This case has been carefully reviewed in light of the Office Action dated June 9, 2005, 2005, wherein claims 1, 2, 4-9 and 11-19 were rejected. Claims 1, 2, 4-9 and 11-19 are pending in the application. Reconsideration of the rejections in light of the following remarks is respectfully requested.

Claims 1-2, 5-9, 12-14 and 19 have been rejected as unpatentable over Margiott US2002/0086200 in view of Chubb US4155981. Applicant respectfully traverses the rejection.

With respect to claims 1, 7, and 19, the references, even if combined, do not teach, suggest, or disclose the recitations of:

1. A cooling apparatus for fuel cell components comprising:

...;

**a plurality of upper ribs in physical contact with said bottom ribs; and**

...;

wherein said top channel and said bottom channel are disposed to allow an initial flow of a **single fluid** therethrough in a top direction through said top channel and a bottom direction through said bottom channel, **the top direction and the bottom direction comprising different directions**, and disposed to allow a portion of said fluid to alternate between said top channel and said bottom channel at a flow redirection area so as to enhance the heat transfer rate between said fluid and said fuel cell components.

7. A fuel cell assembly comprising:

...;

**a plurality of upper ribs in physical contact with said bottom ribs; and**

...;

wherein said top channel and said bottom channel are disposed to allow an initial flow of a **single fluid** therethrough in a top direction through said top channel and a bottom direction through said bottom channel, **the top direction and the bottom direction comprising different directions**, and disposed to allow a portion of said fluid to alternate between said top channel and said bottom channel at a flow redirection area so as to enhance the heat transfer rate between said fluid and said fuel.

19. A cooling apparatus for fuel cell components comprising:

...;

wherein said top channel and said bottom channel are disposed to allow an initial flow of a **single fluid** therethrough in a top direction through said top channel and a bottom direction through said bottom channel, **the top direction and the bottom direction comprising different directions at an angle in the range between about 30 degrees and about 120 degrees with respect to each other**,

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and disposed to allow a portion of said fluid to alternate between said top channel and said bottom channel at a flow redirection area so as to enhance the heat transfer rate between said fluid and said fuel cell components.

As mentioned in the earlier amendments, claims 1, 7 and 19 recite the limitations of the single fluid and the different directions. Claims 1 and 7 further recite that the upper ribs and the bottom ribs are in physical contact with each other.

With respect to claims 1 and 7, Margiott does not teach, suggest, or disclose a cooling apparatus comprising a plurality of bottom ribs coupled to the base plate and a plurality of upper ribs in physical contact with the bottom ribs. The device described by Margiott merely appears to describe a plurality of flow through reactant flow field channels 18 and a plurality of interdigitated reactant flow field channels 21 and 22 (claim 1 and paragraph 3). The fluid flow path is divided in a flow through reactant flow field and an interdigitated flow field wherein the fluid has to travel through the flow through reactant flow field before entering the interdigitated flow field. With respect to claims 1 and 7, the "ribs" of Margiott, for example the straight channels and the interdigitated channels, would not appear to be in physical contact, even during the folding, because of the need for an intervening anode layer.

With respect to each of the independent claims 1, 7, and 19, even if the folded version of Margiott is viewed as creating "top" and "bottom" channels, the initial flow of a single fluid is not through both the top and bottom channels. Instead it is through the flow field channels 18 and then - only when the flow through the channels 18 is complete and the flow is no longer "initial" - is the fluid directed through the flow channels 21 and 22.

Furthermore, there appears to be no alternating "between said top channel and said bottom channel." Instead, the flow in Margiott appears to be in series - going from one folded region to the next and never returning to the original entry layer (whether it be top or bottom).

With respect to the "different directions" recitation, the present Office Action, page 6 cites the new reference of Chubb and states that Chubb describes fluid being carried back and forth horizontally in vertical columns of horizontal channels so the inflowing fluid is partially heat treated by the out-flowing fluid. Even if this were the case, the initial flow would still appear to be in one channel before entering the other and the alternating which is discussed above does not appear to be occurring.

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Furthermore, with respect to claims 1 and 7, Applicant submits that Chubb's channels communicate only at the end regions where the flow from one channel is turned into another single channel. These turns appear to be strictly 180-degree in geometry and require a dividing wall or the heat exchanger will not work (thus the ribs cannot be in physical contact).

Additionally, with respect to claim 19, claim 19 recites a specific angle range – about 30 degrees and about 120 degrees – which is outside the range of Chubb or Margiott. Although page 6 of the Office action suggests that the angle of Margiott is 90 degrees, once the folds occur, it appears that the angle will be 180 degrees.

Therefore, even if the subject matter of Margiott and Chubb were to somehow be combined, claims 1, 7 and 19 are not obvious over such a combination. Claims 2, 5-6, 8-9 and 11-14 depend directly or indirectly on claims 1 or 7 and therefore define allowable subject matter over the applied art. Therefore claims 2, 5-6, 8-9 and 11-14 are believed to be similarly allowable over the applied references.

Claims 4, 11 and 15-18 are rejected as unpatentable over Margiott in view of Chubb, and further in view of Wu et. Al. 2002/0026999. Claims 4, 11 and 15-18 depend directly or indirectly from claims 1 and 7. Applicants respectfully submit that Claims 1 and 7 are patentably distinct from the applied references for the reasons discussed above regardless of cavity shape. Therefore claims 4, 11 and 15-18 are believed to be similarly allowable over the applied references.

Claims 4, 11 and 15-18 are rejected as unpatentable over Margiott in view of Chubb, and further in view of Thonon et. al. 5806584. Claims 4, 11 and 15-18 depend directly or indirectly from claims 1 and 7. Applicants respectfully submit that Claims 1 and 7 are patentably distinct from the applied references for the reasons discussed above regardless of cavity shape. Therefore claims 4, 11 and 15-18 are believed to be similarly allowable over the applied references.

Withdrawal of the rejections is respectfully requested, and allowance of the claims is respectfully solicited.

#### Summary

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

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Should the Examiner believe that anything further is needed to place the application in even better condition for allowance, the Examiner is requested to contact Applicant's undersigned representative at the telephone number below.

Respectfully submitted,

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